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Soil and Water Research

Runoff formation in a tile-drained agricultural basin of the Harz Mountain Foreland, Northern Germany

Herrmann A., Duncker D.:

Soil & Water Res., 3 (2008): 83-97

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By taking two different tile-drained agricultural basins with porous aquifers in the lowlands of northern Germany as examples, it is demonstrated with an integrated study approach that this type of basin responds similarly to an input as forested mountainous basins with dominant fractured rock aquifers in the central European highlands do. The control mechanism is local rise of pressure heads of aquifers starting with the infiltration process. It is shown that drain laterals in agricultural basins function like fractures and faults in those hard rock basins, i.e. as efficient drain pipe lines. This effect is amplified by hydraulic pressure transmission in the course of single input events, and additionally verified here with the help of artificial and environmental tracers. As a result stream flow is predominantly generated by exfiltrating groundwater. For this process drain laterals constitute fast hydraulic short cuts in the sense of preferential flow paths preferably in case that groundwater tables reach up to the level tile-drain networks.

Keywords:

hydrograph separation; hydrological tracers; isotopes; dyes; groundwater; drain sampler

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